

Air Regulations Affecting San Joaquin Valley Agriculture

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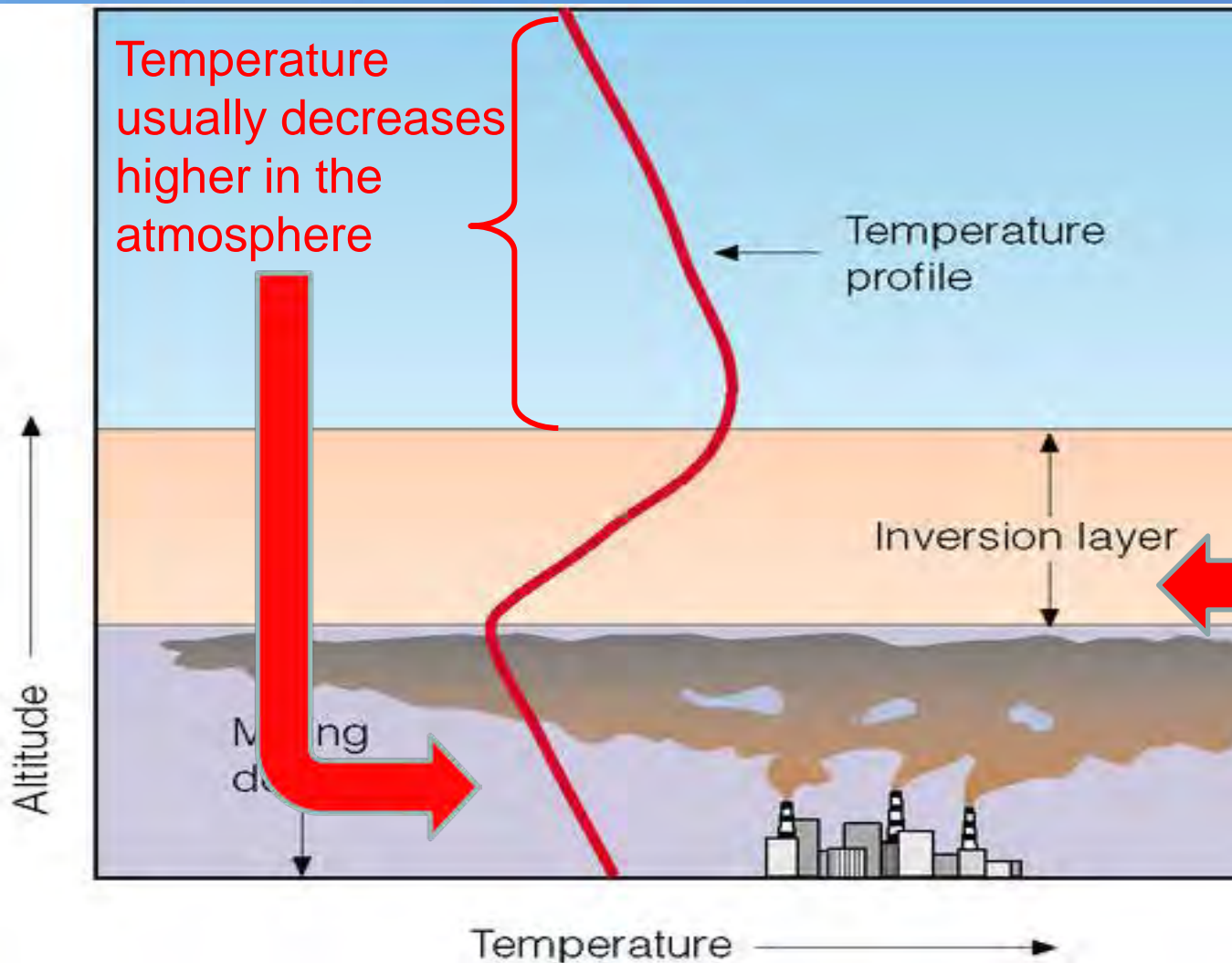
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Valley's Challenges are Unmatched by any Other Region

- Geography and meteorology
- Temperature inversions & long stagnation periods
- Pollution transport
- High “background” levels
- Goods movement
- Fast growing population



Temperature inversions



Inversion: temperature increases higher in the atmosphere, trapping pollution

Valley Faces Unique and Unprecedented Challenge (cont'd)

- No other region faces degree of difficulty
- Bay Area: 6 times more emissions/sq. mile, cleaner air
- South Coast: 10 times more emissions/sq. mile - nearly in attainment already

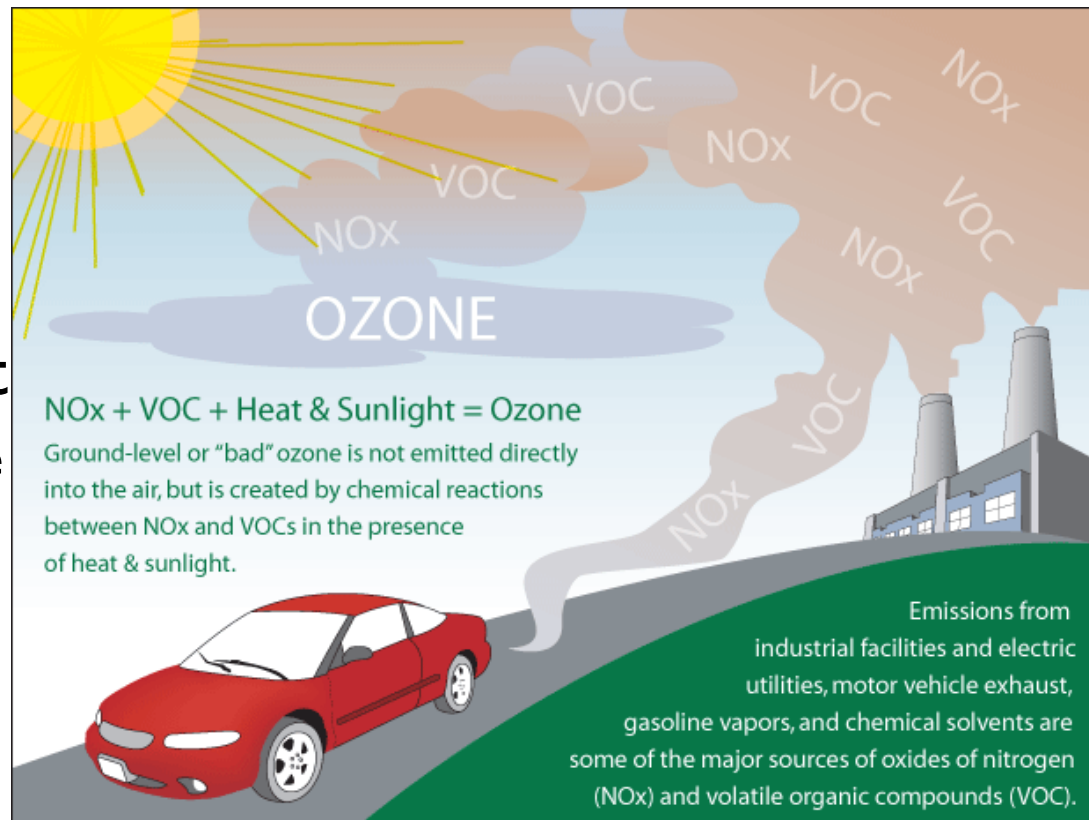


Ozone: “Good up high, bad nearby”



Ozone or Smog

- Precursors: NO_x, Volatile Organic Compounds (VOC)
- Reaction requires high temperature & sunlight
 - We experience high ozone in the summer, with peaks in the middle of the day



Particulate Matter (PM)

- PM10 and PM2.5. Generally: the smaller the particle, the greater the health impact
- Winter problem
- May be emitted as dust and soot

*The inversions that trap fog in the winter also trap emissions from residential wood combustion and other sources

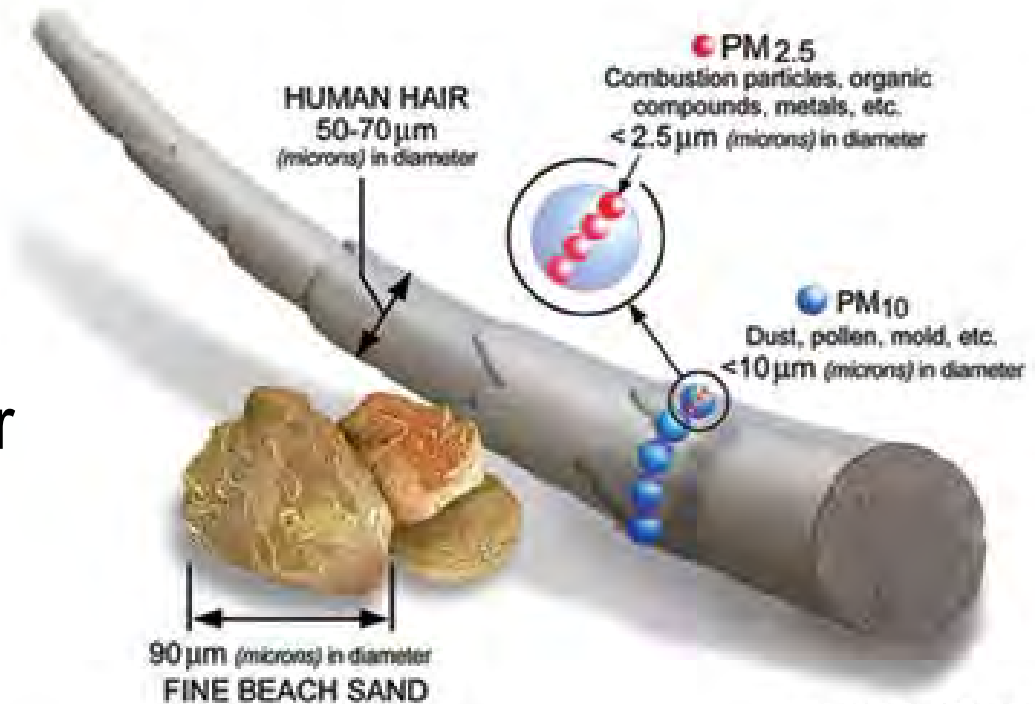


Image courtesy of the U.S. EPA

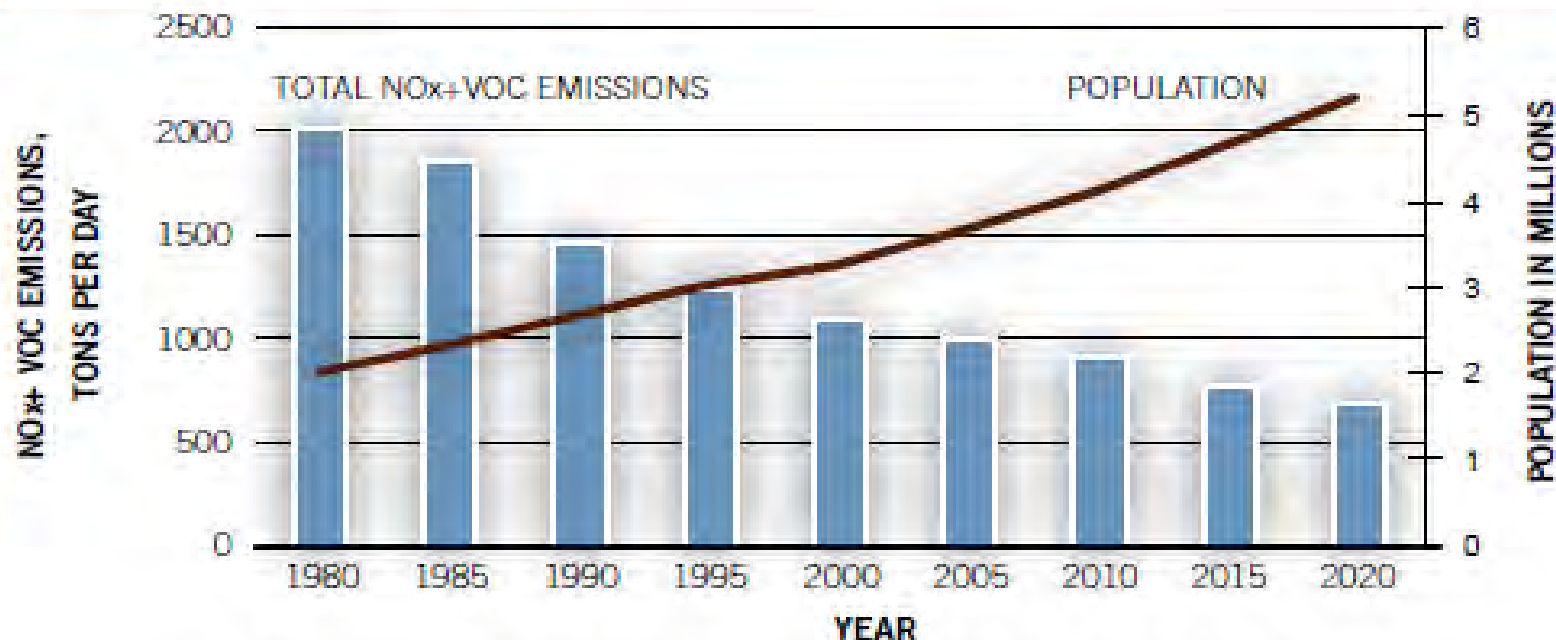
Source Categories

- **Stationary and Area Sources** (permits required if emissions exceed 2 lbs/day):
 - Includes industrial/manufacturing, lawn care, commercial cooking, residential wood burning, agricultural sources, etc.
 - **Account for 15% of NO_x emissions in the Valley**
- **Mobile Sources:**
 - **Mobile sources account for over 80% of NO_x emissions in the Valley and a significant portion of direct PM_{2.5}**
 - District lacks regulatory authority (under ARB and EPA)



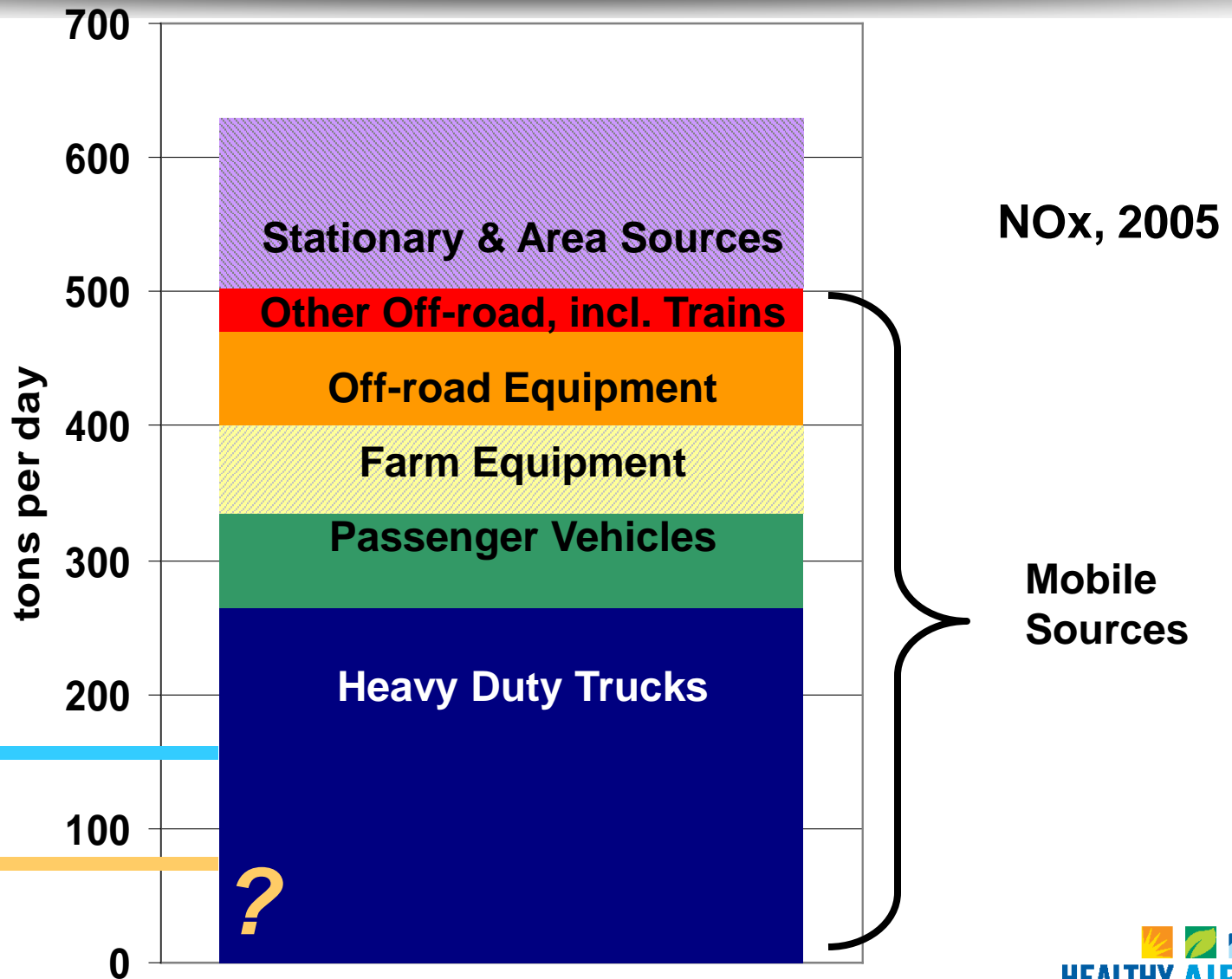
Population Growth Can Undermine Regulatory Progress, Offsetting Emissions Reductions

San Joaquin Valley Population Increases and Emissions Decreases



Emissions reflect ARB Almanac (2007) estimates and do not include emissions reductions from planned control measures.

Sources of Air Pollution in the San Joaquin Valley





Innovative and Transformative Measures Needed to Address Air Quality Challenge

- New federal standards approaching Valley's natural "background" levels
- Additional 80-90% emissions reductions needed to meet new Federal standards
- Innovative and transformative measures
- Investment in new technology

Initial Ag Permitting Applicability

- Senate Bill 700 passed in September 2003
 - Removed the exemption from Agricultural sources as of January 1, 2004
 - Required permits for ag sources only if emissions exceed $\frac{1}{2}$ of a major source threshold
 - Equates to 5 tons/yr or 10,000 lbs/yr

Permit Thresholds for CAFs (VOCs)

- Dairies with > 175 milk cows
- Feedlots with > 4,0000 Cattle
- Heifer Ranch > 1,515 heifers
- Calf Ranch > 8,330 calves
- Poultry
 - Layers and Chickens > 400,000 birds
 - Turkeys > 100,000 birds

Ag Regulations

- Internal Combustion Engines (Rule 4702)
- Conservation Management Practices (CMP) (Rule 4550)
- Confined Animal Facilities (CAFs) (Rule 4570)

District Rule 4702 – Internal Combustion Engines

- Reduces NO_x emissions from existing irrigation and other pump engines
- Applies to all stationary and transportable engines greater than 50 bhp including emergency back-up generators.
- Does not apply to
 - mobile equipment that is self propelled (tractors, harvesters, etc.)
 - wind machines, or
 - ag equipment that is towed or mounted on a vehicle and is continuously moved during its operation (sprayers, balers, etc.)
- Requires engine re-powers and/or catalysts to comply with limits

Engines

- NO TIER 0 engines allowed to operate in Valley since 2010
- TIER 1 and TIER 2 engines to be replaced with TIER 4 engines by 2015 (latest 2018)
- Natural Gas engine NO_x emissions not to exceed 90-150 ppm
- Incentive Department (along with NRCS) has funded the replacement and electrification of Thousands of engines!!!!

The Anaerobic Digester Solution???

BENEFITS

- Renewable Alternative Energy Source
 - Generation of electricity/biogas
- Reduction in VOC emissions
- Reduction in GHG emissions
- Reduction in odors
- Water Quality

The Anaerobic Digester Solution???

DRAWBACKS

- Production of Combustion Emissions (NO_x, SO_x, CO, PM₁₀, VOC)
 - IC Engines
 - Turbines
 - Flares
- Potential Increase in Ammonia Emissions
- Water Quality – Nutrient Management
- Over Fertilization of Forage

Digester Permitting Requirements

- Existing Digesters with biogas engine subject to District Rule 4702

Engine Type	NOx Emissions	CO Emissions	VOC Emissions
Rich burn engines	90 ppmv (or 80% reduction in emissions)	2,000 ppmv	250 ppmv
Lean-burn engines	150 ppmv (or 70% reduction in emissions)	2,000 ppmv	750 ppmv

Anaerobic Digester Requirements

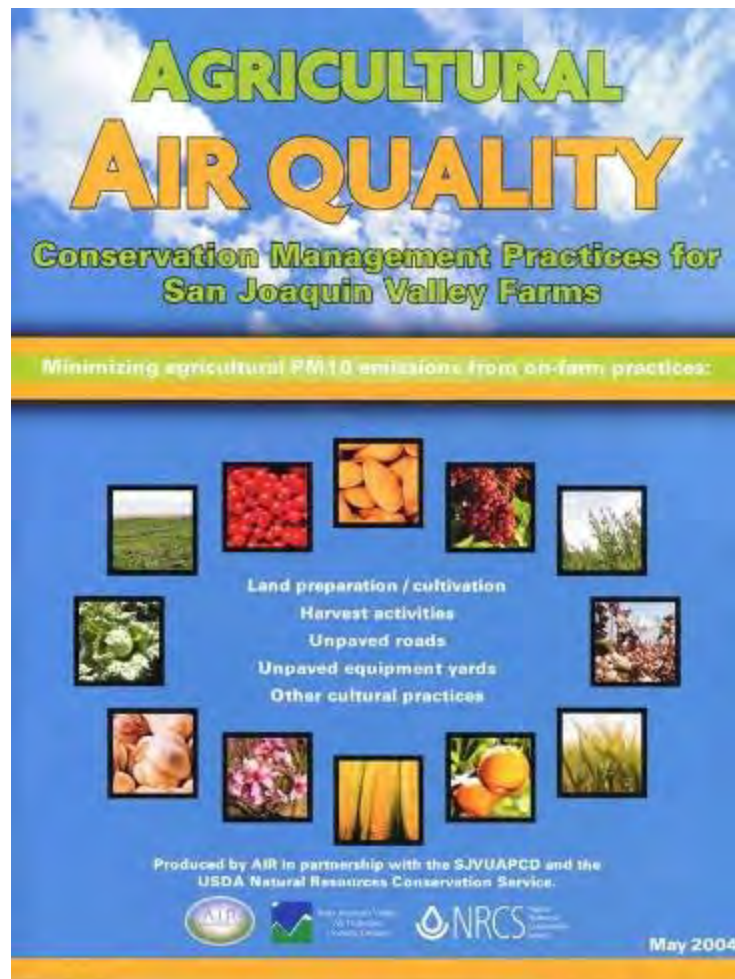
- New Digesters subject to Best Available Control Technology

Pollutant	Achieved in Practice or contained in SIP	Technologically Feasible	Alternate Basic Equipment
VOC	20 ppmv @ 15% O ₂ (as CH ₄)		Biogas injection into the natural gas pipeline network (shall be considered only if on-site power generation is not primary purpose)
NO _x	9 ppmv @ 15% O ₂		
SO _x	50 ppmv Fuel Gas H ₂ S Content		
			20

TAP PROGRAM

- Engine, Fuel, and Emissions Engineering, Incorporated
 - SCR System - Operating at Gallo – 11 ppm Nox
- California Bioenergy
 - NSCR System - Stockdale-Bidart Dairy - 2 ppm NOx
- Ruby Mountain, Inc
 - Gas Liquefier to LPG
- Colony Energy Partners
 - injection into the natural gas pipeline

Conservation Management Practices (CMP) – Rule 4550



- Fugitive dust emission reduction rule
- Over 6,000 plans received
- 3.2 million acres covered
- 35.2 tons/day PM10 reductions, exceed plan requirements

Conservation Management Practices (CMP) Rule 4550

- Applicable if one or more of the following is true:
 - Greater than 100 acres of crops
 - Dairies with over 500 mature Cows (Milk and Dry cows)
 - Feedlot Cattle with over 190 head
 - Other CAFs

Examples of CMPs

- Cropland
 - Chemigation/
Fertigation
 - Combined
Operations
 - Conservation
Irrigation
 - Night Farming &
Harvesting
- Roads/Equipment
Areas
 - Paving
 - Watering
 - Gravel
 - Restrict access

CAF Rule – Rule 4570

- Rule initially adopted in 2006
 - Applied to dairies with $> 1,000$ milk cows
 - Other CAFS at various sizes
- District revised Rule in October 2010
 - Lowered threshold to 500 milk cows
 - Requires additional measures for feed/silage and changes to other categories

Examples of Rule 4570 Requirements

- Feed according to certain guidelines.
- Cover the surface of silage piles, except for the area where feed is being removed from the pile (face)
- Increase density of silage piles
- Reduce size of silage open face
- Remove manure more frequently
- More management of manure in housing

Silage Management Mitigation Measures

- Cover the surface of silage piles, except for the area where feed is being removed from the pile, with a plastic
- Increase the bulk density of piles of at least 44 lb/cu ft for corn silage and 40 lb/cu ft for other silage types
- Reduce overall surface area of open face of pile
- Keep face of piles as smooth as possible

Other Mitigation Measures from other Sources

- Pave feedlanes
- Flush, scrape more frequently
- Inspect water pipes and troughs and repair leaks more frequently
- Clean manure from corrals more frequently
- Slope surface of corrals to keep them dry
- Use of separation systems
- Use of anaerobic treatment lagoons

Ammonia Scientific Findings

- District and ARB evaluated effectiveness of reducing ammonia to assist with attainment
- Modeling and studies show that reductions in ammonia emissions achieve insignificant PM2.5 benefits - ammonia not a significant precursor
 - Reducing one ton of ammonia reduces 0.008 $\mu\text{g}/\text{m}^3$ of PM2.5
 - NOx and directly emitted PM2.5 emissions reductions much more effective in reducing PM2.5 concentrations
- District already reducing 100 tons per day of ammonia emissions from confined animal facilities through Rule 4570 – no additional **feasible** measures
 - Reducing ammonia will not advance attainment

Conclusions

- District focus on reducing emissions from NO_x sources
- Majority of NO_x sources from ag come from ag pump engines
- Largest Percentage of NO_x emissions from mobile sources
- Grants/Incentives have reduced NO_x emissions significantly
- Technology Advancement Program evaluating newest technology to further reduce emissions

Thanks for your attention – now
your turn...

Questions?

